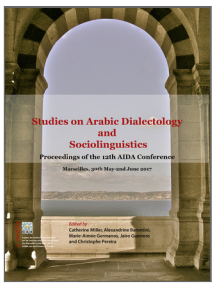

Catherine Miller, Alexandrine Barontini, Marie-Aimée Germanos, Jairo Guerrero and Christophe Pereira (dir.)

Studies on Arabic Dialectology and Sociolinguistics
Proceedings of the 12th International Conference of AIDA held in Marseille from May 30th to June 2nd 2017

Institut de recherches et d'études sur les mondes arabes et musulmans

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DOI: 10.4000/books.iremam.4013
Publisher: Institut de recherches et d'études sur les mondes arabes et musulmans
Place of publication: Aix-en-Provence
Year of publication: 2019
Published on OpenEdition Books: 24 January 2019
Serie: Livres de l'IREMAM
Electronic ISBN: 9791036533891

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AUTHOR'S NOTE

This study was undertaken during my stays at the University of Graz in Austria. I am indebted to Erasmus Mobility Program for facilitating my first visits. I am, also, deeply grateful to Professor Utz Maas for making all resources necessary for undertaking this study available to me. I appreciate him for the fruitful discussions, valuable comments and instructive feedback. Without his considerable help, this work would not have been possible. This work was presented at 25th Manchester Phonology Meeting and AIDA 2017. I would like to thank members of the audience for their insight.

Introduction

1 This paper discusses factors defining syllable structure in connected speech in Moroccan Arabic (MA henceforth). Although this topic seems to have been extensively studied, it continues to be a reminiscent issue. This is due to the uncertainty surrounding syllable boundaries, the status of schwa and its role in syllabification. This work – based on a corpus of a variety of MA spoken in the Middle Atlas – explores the interaction of different levels of grammar in influencing the speakers' preferences of syllabification.

2 The article is structured as follows. Section 2 will shed light on the main contributions to the study of syllable structure in MA. Section 3 presents and discusses data. Section 4 clarifies the interacting factors affecting syllabication in spontaneous speech. Since this is a work in progress, I will not attempt a final model of syllabification. Instead, I will conclude by summarizing the generalizations.

1. Background

3 The unconventional nature of MA syllable structure was first noted decades ago in Harris (1942), Harrell (1962), Abdel Messih (1973), Heath (1987), to name but a few. Despite the excessive research that has taken place since then, there is no agreement on the possible syllables in MA. The first difficulty comes from whether the syllable margins are branching. There are scholars who adopt the 'Complex Onset Hypothesis', which defines consonantal string in such a word as [kla] 'eat' as a branching onset (Benhallam 1980; Heath 1987; Benkirane 1998; Maas 2011). On the other hand, others go for the 'Simplex Onset Hypothesis', and divide such strings into two syllables. Hence, [k.la] is composed of a minor syllable and a main one (Boudlal 2001). The second difficulty is related to the status of schwa and its role in syllabification. It is generally accepted that MA has three phonemic vowels {i, a, u}. It has shortened the long vowels and lost the short vowels of Classical Arabic resulting in consonant clusters, which are eventually split by a short central vowel which the language has developed. This vowel is referred to in most literature as epenthetic schwa (Benhallam 1990; Boudlal 2001; Lahrouchi 2014). More importantly, the identity of schwa is fuzzy. What is referred to by some scholars as (i) schwa vowel (Harris 1942; Benhallam 1990; Heath 1987; Boudlal 2001), is considered as (ii) a schwa like element by others (Dell & El Medlaoui 2002), or (iii) simply an audible release of the consonant by some phoneticians (Gafos et al. 2002). This disagreement is reflected in the transcription of MA which is not uniform across authors. The remainder of this section will elaborate on these points.

4 Benhallam (1990) distinguishes two types of syllabification in MA: full-vowel and schwa syllabification. He puts forward a Syllable Structure Assignment Algorithm (SSAA) which proceeds from right to left in four steps: first, the assignment of CV core syllables, e.g. /mat/ -=> [.ma.t] 'he died'. Second, the building of CəC from unsyllabified CC: e.g. /ktb => [k.təb.] 'he wrote'. The coda assignment rule: e.g. .ma.t => .mat. 'he died'. Finally, the syllabification of stray consonants: /k.təb.t/=> [.ktəbt.] 'I wrote'. However, words with a second geminate consonant and CəCC nouns like [bərd] 'cold' remain problematic. These are regarded to have an underlying syllabic template. Besides, words like [ktəb-t] 'I wrote' require syllabification to apply cyclically to yield the attested output. Also, Benhallam (1990) considers the examples above as monosyllabic, and the consonant sequences preceding and following the nucleus as branching onsets and codas, respectively.

5 Boudlal (2001, 2012) supports the claim made by Benhallam (1990) regarding the epenthetic status of schwa. Nonetheless, he disagrees on the complex nature of syllable edges. He argues that complex onsets are not permitted in MA, and, hence, supports the 'Simplex Onset Hypothesis'. When a word starts with two consonants, the first one forms a syllable on its own and acquires the status "minor syllable" (e.g. [k.la]). Adopting the Optimality framework, he posits a constraint ranking that generates simple onsets, and accounts for schwa epenthesis in verbs and nouns.

6 That onsets are simple in MA finds further support in Lahrouchi (2014), yet from a different perspective. He joins Kaye (1990) to argue that since MA does not impose sequential constraints on clustering and, hence, resorts to epenthetic schwa, it can be analyzed as having only open syllables at the phonological level. Lahrouchi (2014) adopts the strict CV approach to show that consonant clusters result from the computation of empty nuclei.

7 Adopting Fischer's (1967) concept of "syllable of movement" (Arabic ħaraka), Maas (2011) develops an algorithm to generate syllables in MA. Basically, all consonantal lexical segments are potential openings of syllables: C< (k<.t<.b< 'to write'). In other words, each consonant is a potential onset. Subsequently, the last consonant loses the ability of opening a syllable (k<.t<.b<# => k<.t<.>b#). The third step is to get peripheral vowels integrated as sonorous articulations of the opening movement of consonants. The final closure is manifested in the length of the full vowel (e.g. k<.t<a>b# 'book'). Prosody can require a sonorous substrate for intonation contours (e.g. /k<.t<.>b#/ => [ktəb] 'he writes'). It is important to note that C<.C<.C<.....# is avoided; instead, it is realized as C< >C. C<....# e.g. /xnfus/ 'beetle', in which case schwa is inserted between the first two consonants. Maas (2011) develops an Optimality constraint ranking which is different from that in Boudlal (2001, 2012). It accounts for schwa insertion and optimizes branching onsets.

8 Dell & El Medlaoui (2002) embrace a different position regarding syllabification. Their study is different in a number of respects. First, their data comes from poetic verses. Second, they claim that syllables without onset can only occur at the start of a verse. Third, schwa is an unstable vowel, and its realization depends on the surrounding segments. More importantly, they argue that "transitional schwa" is inserted between words when the first one ends and the second one starts in a consonant, hence, creating a further syllable. Thus, their view of the role that schwa plays in syllabification differs from other studies to a great extent.

9 The different attempts made by phonologists have been examined in phonetic studies. A case in point is Shaw et al. (2009, 2011) who use temporal phonetic data to show the heterosyllabic parsing of initial clusters in words such as [ktab] 'book' and [sbati] 'belt'. Hence, their study provides evidence for simple onsets.

10 To recapitulate, there is little agreement regarding syllable structure in MA despite the various perspectives and frameworks used to study it. This is mainly because of (i) the doubt about the nature of the material between consonant clusters, and (ii) (not) accepting the complex syllable margins. Having this settled is crucial to the development of phonological research in MA. Hence, this study tackles the same phenomenon from yet a different perspective and based on new data.

2. The study

2.1. Data

11 Data used in the present study come from a large corpus of spontaneous interactive speech collected specially in the Middle Atlas. Part of it is available on this website: Zentrum.virtuos.uni-osnabruk.de#/utz.maas/Main/Dateien. In order to come up with reliable generalizations, extracts used in this study come from different parts of the corpus denoting the variations possible. They represent productions made by male, female, young, old, literate, illiterate, Berber and non-Berber speaking individuals interacting in slow and fast pace.

12 Data are analyzed using PRAAT (Boersma & Weenink 2005). The immediate remark concerns the difficulty in assembling segments into syllables. In specific, the way speakers arrange their production into syllables rarely satisfies the sonority based

models of syllabification. The data consist of stretches of consonants superior to two, which presents a challenge not only to the Simplex Onset Hypothesis, but also to the predictions concerning schwa insertion. This results in such unexpected consonant clusters as [ndxlu] ‘we get in’. Another observation is the presence of vocalic material where not predicted by the grammar. More importantly, there is a striking inconsistency in syllabifying some words with or without schwa; a case in point is [waʜd] vs. [waʜəd] ‘one’. Such variation is found within and across speakers.

13 So, the hypothesis underlying this study is that speakers’ organization of speech into syllables is based not solely on segmental sequencing; rather it is the result of the interaction of segmental, prosodic, morphological and syntactic information, as well as the pace of speech. The coming section will examine some examples in the light of this hypothesis.

2.1. Analysis

14 The following procedures are followed. Prosodic units are determined. Then, segments are delimited and measured in duration before they are assembled into syllables. The last step is not a straightforward task given the observations sketched above and the hypothesis underlying the study. In order to determine syllable boundaries, several levels of analysis are considered, namely, phonology, morphology, syntax, prosody, rate of speech. Since this is a work in progress, I will suffice by detangling the interaction between morphology and phonology and its influence by the rate of speech.

15 Syllabification of words is attempted; i.e. morphological words are taken out of their context and syllabified as if produced in isolation or in a carrier phrase as done in controlled data. However, the nature of the corpus used in this study makes examining morphological words an intricate job. First, words in controlled data are realized differently from those in spontaneous speech, and, hence, do not represent the actual speakers’ production. This is because elements that control syllabification in normal speech are absent in controlled data. Second, the whole lexical word can be reduced, and in extreme cases, deleted altogether in connected speech, which makes determining syllable boundaries of a word challenging. Thus, in this study, syllabification is considered within the larger frame of prosody.

16 Let’s start with the example in (1). The first line represents the actual production, the second line marks the morphemes and the location of schwa if words were in isolation. The third line provides transliteration and the fourth English translation.

(1)	kangləs	ɣi	fəllaʁđ
	ka+n+gləs	ɣi	f+l+aʁđ
	Prog+1pr sg+sit	Just	in+det+floor
	I sit just on the floor		

17 On the face of it, the actual production satisfies syllabification models proposed in the literature. Schwa is inserted to generate the expected syllable structure in [kan.gləs] or [kan.g.ləs] according to the Simplex Onset Hypothesis and Complex Onset Hypothesis,

respectively. Notice that although the syllables in [fəl.laʁđ] are well-formed, schwa insertion is not predicted by the current approaches: they would generate [flaʁđ] or [f.laʁđ] instead. Also, Schwa insertion triggers gemination of the following consonant to guarantee a closed syllable.

18 So far, it seems that syllabification of words in connected speech is not different from that in controlled data. It is worthy to note that the utterance in (1) is produced by a female speaker in slow pace. However, as soon as the pace gets faster, different syllable structures appear. Consider the example below:

(2)	huma	kejgəlsu	ʕ	sːnađq	ʃi	wʁdin
	huma	Ka+i+gəls+u	ʕla	s-snađəq	ʃi	wəʁd+in
	They	prog+sit+3rd pl	on	crates (broken pl)	some	one+pl
	Some people sit on crates					

19 With the exception of the first two words ([hu.ma.kej.gəl.su]), syllabification diverges from the predicted output to a great extent. Gliding of [i] in /ka+i+gls+u/ avoids hiatus, and results in a closed syllable with a raised nucleus as the outcome of coarticulation. Discussion about the latter is beyond the scope of this paper, and, thus, will be avoided.

20 As one proceeds in the analysis, syllable boundaries become unclear. Notice that the vowel and the preceding consonant are deleted in /ʕla/ resulting in [ʕ] only. This becomes subject to re-syllabification: [ʕsːnađq] starts with a cluster of four consonants. PRAAT analysis confirms the lack of any vocalic element splitting these consonants, which makes it a challenging case to current models of syllabification. Also, given that the geminate /sː/ cannot be separated, schwa is expected to be inserted between /ʕ/ and /sː/ and produced like [ʕəs.sna.đəq], but the speaker chooses not to do so. Such a case is neither predicted nor resolved by current approaches to syllabification in MA. The one that allows onsets to consist of maximally two consonants will be faced with an over-sized onset, whereas the other that resorts to minor syllable will have a series of three minor syllables preceding the main one. A flexible account that allows syllabic consonants is required. Thus, an alternative analysis would be one that considers /ʕ/ as the nucleus of the first syllable and the geminate /sː/ to be ambisyllablic.

21 Furthermore, note that schwa epenthesis does not occur between /đ/ and /q/ as predicted. Phonetic analysis rules out the presence of a vowel separating the two consonants. Whether they form a cluster or a one complex consonant requires a meticulous phonetic investigation, which is not available at this stage of research. So, I will mark them as two separate consonants. The resulting syllable structure would, hence, be [ʕs.s.nađq].

22 Since CCC cluster is not allowed in MA (Maas 2011), /wʁdin/ should be syllabified as [wəʁ.din]. However, Phonetic analysis shows no vocalic trace between the first three consonants. So, analogously to the previous example, it is produced as [wʁ.din] where /ʁ/ is the nucleus.

23 The proposed analysis results in two unconventional syllable structures: [ʕs] and [wħ]. Now that it is sure that there is no vowel involved, the question that remains is why /ʕ/ and /ħ/ are regarded to be syllabic. In the absence of a more detailed phonetic analysis at this stage, one can only speculate. To start with, /ʕ/ is the nucleus for two reasons. First, it is more sonorous and longer than the next consonant. Second, /s/ is part of a geminate which is ambisyllabic and, hence, can only be a coda. Concerning the syllable [wħ], the fricative acts the nucleus because it is longer. Besides, there is certain degree of "vowelness" involved in both consonants, which makes them sometimes "unparsable" from the next vowel. Such claim requires an in-depth analysis to be conducted in a coming stage of this work.

24 Let's now discuss syllabification in the example below:

(3)	mbɣawʃ	ixliwna	ndxlu	liha
	ma+bɣa+u+ʃ	i+xll+iu+na	n+dxl-u	li+ha
	neg+want+3rd pl +neg	3rd pl+let+3rd pl+ us	we+enter+ 1st pl	To+ it (fem)
	They did not let us get in			

25 There are two instances where schwa is not inserted as predicted. The first one is / i+xll+i+u+na/ 'they let us', where schwa is expected between /x/ and /l/. The lack of schwa results in degeminating /ll/ with a duration of 0.040 msc. This supports the view that MA onset is maximally two consonants (Maas 2011).

26 The second case is /n+dxl+u/ 'we enter'. Present approaches predict schwa insertion between /d/ and /x/ resulting in [ndəx.lu] or [n.dəx.lu]. However, phonetic analysis confirms the lack of any vowel element separating the consonants. This leads /x/ to acts the nucleus.

27 Finally, /ma+bɣa+u+ʃ/ 'they did not want' is produced in spontaneous speech as [mbɣawʃ] starting with a three consonant cluster. This presents a further challenge to most existing approaches to syllable structure in MA. There is no vocalic material separating /m/ and /b/ according to phonetic analysis. /u/ acquires consonantal feature to avoid hiatus and, hence, becomes a coda. Finally, /ʃ/ is re-syllabified with the vowel starting the next word. Thus, the speaker organizes his utterance into syllables as follows: [mb.ɣaw.ʃi.xliw.nan.dx.lu.li.ha].

28 Last but not least, I will discuss one more intriguing example:

(4)	gal+li+k	xss+k	t+ʒib	viza	mn	l+məɣrib
	kˣ	xəsk	tʒib	viza	m	mə ɣrib
	say 3rd pr sg+ to +you (sg)	must+you (sg)	you(sg)+ bring	visa	from	Morocco
	It is said that one must get a visa in Morocco					

29 Like example (3), this is an extract from an interaction made in fast pace. The striking remark is the omission and reduction of several syllables. To start with, both syllables of the word /gal.lik/ disappear leaving behind just the affricate [kˣ] of 0.050 msc. This will evidently be re-syllabified with the subsequent word.

30 Current literature predicts schwa insertion in CCCC sequence between the first and the second pairs of consonants (CəC.CəC). Hence, /xssk/ 'you must' should be syllabified as [xəs.sək]. Nonetheless, this word is realized as one syllable: [xəsk]. Clearly /ss/ is degeminated with a duration of 0.046 msc; this is due to the choice of the speaker not to insert schwa.

31 The last part in this example (/mn#l+mɣrib/ 'from Morocco') should be syllabified with three syllables ([mən.ləmɣ.rib]) or more according to Dell and El Medlaoui (2002). However, it is syllabified differently in our data. Phonetic examination shows no vocalic element between /m/ of /mən/ 'from' and /m/ of /məɣrib/ 'Morocco'. The speaker disposes of not only the rhyme of /mən/, but also of /l/ preceding /məɣrib/. So, [m] is produced with a duration of 0.140 msc and a falling F0. Hence, this utterance is produced with fewer syllables than predicted by the grammar.

32 One more important observation. Schwa is inserted between [xəsk] 'you must' and [tʒib] 'you bring'. This is the first instance encountered so far where schwa occurs between two words as predicted in Dell and El Medlaoui (2002). Schwa is of a considerable length: 0.058 msc, and, so, is not mistaken for the release of the preceding stop. I assume that this is to avoid the succession of complex coda in [xəsk] and complex onset in [tʒib]. So, the syllable boundaries are marked as follows: [kˣxəs.kət.ʒib.vi.za.mməɣ.rib].

33 To recapitulate, the speakers' syllabification of the instances discussed in this study is summarized here:

a) [kan.gləs.ɣi.fəl.laʀđ]
b) [hu.ma.kej.gəl.su.ʕs.snađq.ʃi.wʜ.din]
c) [mb.ɣaw.ʃi.xliw.nan.dx.lu.li.ha]
d) [kˣxəs.kət.ʒib.vi.za.mməɣ.rib]

34 These examples demonstrate that speakers can have different preferences of syllabification. I have shown that in spontaneous speech, full vowels can be deleted and schwa might not be inserted. The resulting consonant clusters, in turn, leads to syllables with no vowels. In the next section, I will elaborate on the interacting factors leading to such structures.

2. Discussion

35 Data investigated in this study provide ample evidence that there is more to syllabification than just segments. Syllable structure is the outcome of the interaction of various components of language and should, hence, be considered at different levels of analysis. In this section I will discuss how phonology and morphology interact in affecting the speakers' preferences in defining syllable boundaries. I will also briefly discuss how such interaction is affected by the pace of speech. For the sake of clarity, I will use a couple of examples to argue for this point.

36 Let's consider the underlying structure /ma+bɣa+u+ʃ#i+xll+iu+na/ 'they did not want to let us', which is realized as [mb.ɣaw.ʃi.xliw.na]. The first part of the circumfix -ma...ʃ-

'not' is reduced to [m]. The second part of the cleft morpheme is maintained. It is regarded to be semantically transparent enough to denote negation on its own. Such reduction neither affects the meaning nor disturbs the flow of the conversation. This implies that the first half of the morpheme is taken to be semantically redundant by the speaker, and, hence, is disposed of in fast speech.

37 A slightly similar case is (4): /gal+li+k#xss+k#t+ʒib#viza#mən#l+məɣrib/ is produced as [kˣxəs.kət.ʒib.vi.za.mməɣ.rib]. A supposedly ten syllable utterance (or more according to Dell & El Medlaoui, 2002) is realized as seven syllables only. /gallik/ 'it is said' is semantically empty; it does not contribute to the meaning of the utterance, and, hence, lies outside the prosodic unit [xəsk tʒib viza mməɣrib] 'you must get the visa in Morocco'. So, like the example above, reduction does not affect neither the meaning nor the abstract form of the morpheme. The two are cases of fast speech where phonology triggers a production with less syllables, and so erases redundant and semantically empty morphemes. What is striking is that despite reduction, research assistants who have participated at the transcription of the corpus have transcribed it as [gallək]. Why and how do hearers have access to deleted parts of speech is a question for a separate study.

38 On the other hand, morphemes are fully articulated when produced in slow pace. A case in point is [kan.gləs.χi.fəl.laɾđ]. The output maintains all segments in the input; a transitional schwa is added; and a greater number of syllables are produced.

39 To recapitulate, I have shown that morphemes which are redundant or do not contribute to meaning are reduced or deleted in spontaneous fast speech. As a result, the speaker produces a prosodic unit with fewer syllables than in fast pace. On the other hand, phonology and morphology interact differently in slow speech. All morphemes are realized, resulting in syllabification by schwa, and, hence, a production with more syllables.

Conclusion

40 This paper has argued that syllabification in spontaneous interactive speech in MA is different from that in words in isolation of controlled data. It has been shown that slow speech rate can cause transitional schwa insertions between consonant clusters which appear as vocalic traces in the acoustic signal. On the other hand, in faster speech, phonology removes redundant and semantically empty morphological material. So, the quantity of syllables is reduced and syllable structures vary allowing syllabic consonants and complex margins. Another important finding is that Faithfulness constraints are active only at the lexical level, the analysis of which is not always accessible in fast speech. The next step in the current research is to investigate how variation in syllabification is controlled within the wider window of prosody to include other levels of grammar.

BIBLIOGRAPHY

Benhallam, A. 1980. *Syllable Structure And Rule Types In Arabic*. PhD Dissertation. Gainsville: University of Florida.

Benhallam, A. 1990. 'Moroccan Arabic Syllable structure'. *Language et Literature* VIII. 177-191.

Bensoukas, K. & A. Boudlal. 2012. 'The Prosody of Moroccan Amazigh and Moroccan Arabic: Similarities in the Phonology of Schwa', Borowsky, T. et al. (eds.), *Prosody Matters: Essays in Honor of Lisa Selkirk*. London: Equinox. 3-42.

Boersma, P. & D. Weenink. 2005. Praat: doing phonetics by computer (Version 4.3.01) [Computer program]. Retrieved from http://www.praat.org/

Dell, F. & M. El Medlaoui. 2002. *Syllables in Tashlhiyt Berber and in Moroccan Arabic*. Dordrecht: Kluwer.

Heath, J. 1987. *Ablaut and Ambiguity: Phonology of A Moroccan Arabic Dialect*. Albany: SUNY Press.

Maas, Utz. 2011. *Marokkanisches Arabisch*. München: LINCOM Sprachlehrbucher

Shaw J, A. Gafos, P. Hoole, C. Zeroual. 2009. 'Syllabification in Moroccan Arabic: evidence from patterns of temporal stability in articulation'. *Phonology* 26. 187–215.

Zec, D. 2005. 'Prosodic Differences among Function Words'. *Phonology* 22 - 1. 77-112.

APPENDIXES

List of Abbreviations

1st pr : 1st person

3rd pr: 3rd person

Det: determiner

Fem: feminine

Neg: negation

Prog: progressive

Sg: singular

Pl: plural

ABSTRACTS

The role of schwa in syllabification has been a challenging phenomenon in Moroccan Arabic (MA), and, consequently, defining syllable boundaries has been a thorny issue. This paper uses data of spontaneous speech to reveal that syllabification would be better understood when it is considered within the larger frame of prosody. It is argued that syllabification in MA is the outcome of the interaction of different components of grammar. This article particularly shows

how morphology and phonology interact in slow and fast speech to guide the speaker's formation of syllables.

INDEX

Keywords: Syllabification, prosody, morphology, phonology, pace of speech

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